

CLAIMS

What is claimed is:

1 1. A drive for imparting a vibratory force to a vibrating member
2 with a driving member, the vibrating member suspended above a
3 surface of a substrate by a support flexure, comprising:

4 first comb electrodes connected to the driving member;

5 second comb electrodes connected to the vibrating member, said
6 second comb electrodes interleaved with said first comb electrodes,
7 an overlap region defined thereby, a gap being defined between the
8 substrate surface and the interleaved comb electrodes; and

9 a trench formed in the substrate substantially between the
10 interleaved comb electrodes and the substrate such that the gap
11 between the substrate surface and the interleaved comb electrodes
12 is increased.

1 2. The drive of Claim 1 wherein said trench has a width dimension
2 which is greater than or equal to said overlap region.

1 3. The drive of Claim 2 wherein said trench has a depth dimension
2 which is from 6 μ m to 10 μ m, inclusive.

1 4. The drive of Claim 3 wherein said trench is formed by a
2 dissolved wafer process.

1 5. The drive of Claim 2 wherein said trench has a depth dimension
2 which is greater than 10 μ m.

1 6. The drive of Claim 5 wherein said trench is formed by a
2 technique selected from the group consisting of reactive ion
3 etching, chlorine etching, SF₆ etching and anisotropic etching.

1 7. A tuning fork gyroscope comprising:

2 a substrate with a surface;

3 an outer drive with comb electrodes;

4 an inner drive with comb electrodes;

5 proof masses with inner and outer comb electrodes, said proof
6 masses suspended above said substrate by support flexure, said
7 inner comb electrodes interleaved with said inner drive comb
8 electrodes and said outer comb electrodes interleaved with said
9 outer drive comb electrodes, an overlap region defined by said
10 interleaved comb electrodes, a gap being defined between the
11 substrate surface and the interleaved comb electrodes; and

12 trenches formed in said substrate substantially between said
13 inner interleaved comb electrodes and said substrate such that the
14 gap between said substrate surface and said inner interleaved comb
15 electrodes is increased.

1 8. The tuning fork gyroscope of Claim 7 wherein said trenches
2 have a width dimension which is greater than or equal to said
3 overlap region.

1 9. The tuning fork gyroscope of Claim 8 wherein said trenches
2 have a depth dimension which is from $6\mu\text{m}$ to $10\mu\text{m}$, inclusive.

1 10. The tuning fork gyroscope of Claim 8 wherein said trenches
2 have a depth dimension which is greater than $10\mu\text{m}$.

1 11. The tuning fork gyroscope of Claim 9 wherein said gap is
2 increased by said trenches from about $2.5\mu\text{m}$ to a gap from $8.5\mu\text{m}$ to
3 $12.5\mu\text{m}$, inclusive.

1 12. The tuning fork gyroscope of Claim 8 wherein trenches are also
2 formed in said substrate substantially between the outer
3 interleaved comb electrodes and the substrate.

1 13. The tuning fork gyroscope of Claim 12 wherein said trenches
2 have a depth dimension which is from $6\mu\text{m}$ to $10\mu\text{m}$, inclusive.

1 14. The tuning fork gyroscope of Claim 12 wherein said trenches
2 have a depth dimension which is greater than $10\mu\text{m}$.

1 15. The tuning fork gyroscope of Claim 13 wherein said gap is
2 increased by said trenches from about $2.5\mu\text{m}$ to a gap from $8.5\mu\text{m}$ to
3 $12.5\mu\text{m}$, inclusive.

1 16. The tuning fork gyroscope of Claim 7 wherein trenches are also
2 formed in said substrate substantially between the support flexure
3 and the substrate.

1 17. In a tuning fork gyroscope having interleaved comb electrodes
2 and a substrate surface with a gap defined therebetween, a method
3 for alleviating undesirable effects of substrate voltage transients
4 on gyroscope operation comprising the step of:
5 increasing the gap between the interleaved comb electrodes and
6 the substrate surface.

1 18. The method of Claim 17 wherein said increasing step includes
2 forming trenches below the interleaved comb electrodes.

1 19. The method of Claim 18 wherein the gyroscope includes a
2 support flexure and the method includes forming trenches below the
3 support flexure.

1 20. The method of Claim ¹⁷18 wherein ^{step of}said forming ^{the trench}step is
2 accomplished by a technique selected from the group consisting of
3 reactive ion etching, chlorine etching, SF₆ etching and anisotropic
4 etching.